

ABSTRACT OF THE INVENTION

Method and apparatus for steam reforming a sulfur-containing hydrocarbon fuel, such as a diesel hydrocarbon fuel. The apparatus includes a desulphurization unit, a pre-reformer, and a steam reforming unit. A carbon dioxide fixing material is present in the steam reforming catalyst bed to fix carbon dioxide that is produced by the reforming reaction. The carbon dioxide fixing material is an alkaline earth oxide, a doped alkaline earth oxide or a mixture thereof. The fixing of carbon dioxide within the steam reforming catalyst bed creates an equilibrium shift in the steam reforming reaction to produce more hydrogen and less carbon monoxide. Carbon dioxide fixed in the catalyst bed can be released by heating the carbon dioxide fixing material or catalyst bed to a temperature in excess of the steam reforming temperature. Fuel processors having multiple catalyst beds and methods and apparatus for generating electricity utilizing such fuel processors in conjunction with a fuel cell are also disclosed.